

REMARKS

The Office Action mailed November 29, 2002, has been received and reviewed. Claims 16-30 are currently pending in the application. Claims 16-30 stand rejected. Claims 24 and 26 have been cancelled. Applicants have amended claims 16, 28, 29, and 30, and respectfully request reconsideration of the application as amended herein.

Supplemental Information Disclosure Statement

Please note that a Supplemental Information Disclosure Statement was filed herein on January 29, 2002, and that several references on the PTO-1449 were indicated by the Examiner as missing. Applicants respectfully request that the information cited on the PTO-1449 filed with the Supplemental Information Disclosure Statement of January 29, 2002 be made of record herein. For the sake of convenience, a second copy of the January 29, 2002, Supplemental Information Disclosure Statement, PTO-1449 with copies of cited references indicated as missing (AS, AT, AV, AW of sheet 2, and CK, CL and CM of sheet 5) are enclosed herewith. Applicants note that on Page 1 of Form PTO-1449, under AR, the "See Attachment" indication refers to Page 2 of 5 through Page 5 of 5 of the PTO-1449 containing cited references AR through CN. It is respectfully requested that an initialed copy of the PTO-1449 evidencing consideration of the cited references be returned to the undersigned attorney.

Objections

The disclosure was objected to due to informalities in the specification. The Examiner states that the previous amendment to correct this error, which was submitted in Applicants' Office Action response mailed October 31, 2001, was not entered "because the amendment was not appropriated for page 10." Office Action of November 29, 2002, p. 2. Applicants have rechecked the location of this amendment and confirm that the appropriate location for this amendment is on p. 10, line 13 through p. 11, line 6. Therefore, Applicants respectfully request that this objection be withdrawn. Applicants also respectfully request that if further objections to this amendment exist, the Examiner more specifically identify the problems with the amendment.

Applicants note that the application used by the Examiner does not appear to have the

same pagination as the Applicants' as-filed copy. In the outstanding Office Action, the Examiner rejects certain claims under 35 U.S.C. § 112 and refers to sections of the specification in support of her arguments. However, the arguments are not always supported by the portions of the specification cited by the Examiner. For example, the Examiner states that p. 8 of the specification provides for modifying the temperature and/or pressure to separate. However, p. 8 of Applicants' as-filed copy does not provide for modifying the temperature or pressure. Rather, the support for this statement is found on p. 10, lines 14-17 of Applicants' as-filed copy, which is a portion of the paragraph to be amended in the instant response. In addition, the Examiner states that claim 29 "is in conflict with the specification at lines 6-8 of the first paragraph" of an undisclosed page of the specification. Applicants note that their as-filed copy includes the cited section on p. 9, lines 6-8 of the specification.

To clarify the location of the amendment to the specification, Applicants include with this response a copy of the as-filed application that is in Applicants' possession. All references by Applicants to the instant specification refer to their location in this as-filed copy.

35 U.S.C. § 112 Claim Rejections

Claim 30 stands rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicants respectfully traverse this rejection, as hereinafter set forth. The Examiner states that the limitation of "controlling the temperature and pressure of the reaction conditions" is new matter. However, support for this limitation is found in the specification at p. 4, lines 6-7. Therefore, Applicants respectfully request that the objection be withdrawn.

Claims 26-29 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. Applicants respectfully traverse the rejections, as hereinafter set forth.

Claim 26 has been cancelled, making the § 112 rejection moot.

Claim 27 has been rejected because, allegedly, "it is unclear when the said components

are short chain alcohol and water of step 3 or co-solvent of claim 27.” Office Action of November 29, 2002, p. 3. The specification discloses that the organic composition and the short chain alcohols are dissolved in the critical fluid medium and are reacted to produce the alkyl ester and glycerol. See p. 6, lines 17-20; p. 9, lines 5-6. The choice of short chain alcohol used in the reaction depends on the desired alkyl ester that is to be formed as one of the products. See p. 8, lines 6-10. The co-solvent is a component that is optionally used with the critical fluid medium. See p. 8, lines 18-20. While some of the same chemical compounds may be used as the short chain alcohol or the critical fluid co-solvent, this does not create confusion in the claims, which recite clearly that the short chain alcohol and the critical fluid co-solvent are separate and distinct elements. Further, the specification clearly discloses the criteria used in choosing a particular component as the short chain alcohol. Therefore, Applicants respectfully request that the objection be withdrawn.

Claim 28 has been rejected because it is allegedly unclear when the listed component is a co-solvent and when it is a short chain alcohol. Applicants respectfully request that the objection be withdrawn for the reasons previously discussed in regard to claim 27.

Claim 29 has been rejected because it is allegedly in conflict with the specification. Applicants have amended claim 29 and respectfully request that the objection be withdrawn. The Examiner also asserts that there is no support for the “co-solvent” in line 16 because the co-solvent is not provided for in a previous part of the claim. Office Action of November 29, 2002, p. 4. Applicants respectfully submit that this rejection is improper because there is no requirement that the co-solvent be recited in a “providing” step. In addition, claim 29, as written, has proper antecedent basis for the co-solvent. Claim 29 provides the first mention of the term “co-solvent” and, therefore, the claim properly recites “wherein the critical fluid medium is one selected to have . . . a critical pressure as modified by a co-solvent.” (Emphasis added). Claim 29 was amended to recite “a co-solvent” in the Office Action response filed on July 9, 2002.

35 U.S.C. § 102(b) Anticipation Rejections

Anticipation Rejection Based on Vieville et al.

Claims 16, 17, 20-23, 26, 27, 29, and 30 stand rejected under 35 U.S.C. § 102(b) as being

anticipated by Vieville *et al.* (“Vieville”). Applicants respectfully traverse this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Vieville discloses a method of esterifying oleic acid by methanol in supercritical carbon dioxide (“CO₂”). p-toluenesulfonic acid (“p-TSA”) and cation-exchange resins are used as catalysts in the esterification reaction. To esterify oleic acid to form methyl oleate, the oleic acid, methanol, and the catalyst are placed in a sapphire reactor and CO₂ is flowed into the reactor. The reaction catalyzed by p-TSA is conducted in a homogenous phase while the reaction catalyzed by the cation-exchange resins is performed in a heterogenous phase.

As amended herein, claim 16 recites a process for producing alkyl esters useful in biofuels and lubricants. The process comprises providing an organic composition having one or more components selected from the group consisting of acylglycerols, fats, oils, waxes, and free fatty acids. A critical fluid medium including one or more fluids selected from the group consisting of carbon dioxide, sulfur dioxide, methane, ethane, propane, and mixtures thereof is also provided. The organic composition and a C₁-C₄ short chain alcohol is dissolved into the critical fluid medium. The organic composition is reacted with the short chain alcohol in the presence of a catalyst in a single phase to produce a final product comprising an alkyl ester and glycerol, wherein the glycerol leaves the single phase as it is formed. The glycerol is separated from the alkyl ester and the alkyl ester is separated from the critical fluid medium. The critical fluid medium is selected so that, when combined with the organic composition, the critical fluid medium provides decreased loss of catalyst or catalytic activity and elimination of mass transfer limitations by maintaining the various reactants in a single phase.

Vieville does not describe each and every element of claim 16, as amended, because Vieville does not disclose “separating the glycerol from the alkyl ester” and “separating the alkyl ester from the critical fluid medium.” As discussed below, Vieville does not mention producing

glycerol and, therefore, necessarily does not disclose that glycerol is separated from methyl oleate. Vieville is also completely silent on separating the reaction products when critical fluids are used. Rather, separation is only disclosed when conventional media are used. See the bridging paragraph of columns 1-2 of page 2065. Furthermore, the separation process disclosed with the conventional media uses a filtration technique to separate the catalyst and the organic phase, which is not analogous to the process of the present invention where the glycerol leaves the single phase as it is formed. Vieville also does not disclose that the methyl oleate produced during the esterification reaction is separated from the critical fluid.

Vieville also does not disclose “reacting the organic composition with the short chain alcohol in the presence of a catalyst in a single phase to produce a final product comprising an alkyl ester and glycerol.” First, Vieville does not disclose that glycerol is formed as a product of the esterification reaction. Vieville only teaches that methyl oleate is formed by the reaction. The esterification reaction of Vieville and a transesterification reaction are not the same chemical reaction and, as such, do not produce the same products. While the transesterification reaction produces glycerol, glycerol is not produced by the esterification reaction. Therefore, Vieville does not disclose the formation of glycerol.

Vieville also does not disclose that “the critical fluid medium provides decreased loss of catalyst or catalytic activity and elimination of mass transfer limitations by maintaining the various reactants in a single phase,” as recited in claim 16. In Vieville, the esterification reaction actually poisons the resin with oleic acid and methyl oleate and, therefore, the catalytic activity of the resin is decreased. In contrast, the claimed invention provides a decreased loss of catalytic activity.

Since Vieville does not describe each and every element of the claim, claim 16 is allowable and Applicants respectfully request that the rejection be withdrawn.

Claims 17, 20-23, 26, 27 are allowable as depending from an allowable base claim.

Claim 27 is further allowable because Vieville does not disclose that the critical fluid medium includes a critical fluid co-solvent selected from the group consisting of methanol, ethanol, butanol, and water.

Claim 29 recites a process for producing alkyl esters useful in biofuels and lubricants. The process comprises providing an organic composition comprising one or more components selected from the group consisting of acylglycerols, fats, oils, waxes, and free fatty acids. A critical fluid medium including one or more fluids selected from the group consisting of carbon dioxide, sulfur dioxide, methane, ethane, propane, and mixtures thereof, is also provided. The organic composition and a C₁-C₄ short chain alcohol are dissolved into the critical fluid medium. The organic composition is reacted with the short chain alcohol in the presence of a catalyst at a temperature from about 20°C to about 200°C and a pressure from about 150 psig to about 4000 psig. The reaction occurs in a single phase to produce a final product comprising an alkyl ester and glycerol, which leaves the single phase as it is formed. The critical fluid is selected such that a reaction temperature is within about 20% of a critical temperature of the critical fluid medium and a reaction pressure is within about 0.5 to about 15 times a critical pressure of the critical fluid medium as modified by a co-solvent.

Vieville does not describe each and every element of claim 29 because Vieville does not disclose “reacting the organic composition with the short chain alcohol in the presence of a catalyst at a temperature from about 20°C to about 200°C and a pressure from about 150 psig to about 4000 psig, wherein the reaction occurs in a single phase to produce a final product comprising an alkyl ester and glycerol and wherein said glycerol leaves the single phase as the glycerol is formed” for the same reasons discussed above with claim 16.

Since Vieville does not describe each and every element of the claim, claim 29 is allowable and Applicants respectfully request that the rejection be withdrawn.

Claim 30 recites a process for producing alkyl esters useful in biofuels and lubricants. The process comprises providing an organic composition comprising one or more components selected from the group consisting of acylglycerols, fats, oils, waxes, and free fatty acids. The organic composition and a C₁-C₄ short chain alcohol are dissolved into a critical fluid medium, wherein the critical fluid medium is one or more fluids selected from the group consisting of carbon dioxide, sulfur dioxide, methane, ethane, and propane, and mixtures thereof. The critical fluid medium solubilizes the organic composition and the C₁-C₄ short chain alcohol into a single phase. The organic composition is reacted with the C₁-C₄ short chain alcohol in the presence of a

catalyst in the single phase. A final product comprising an alkyl ester and glycerol is produced, wherein the glycerol is separated from the alkyl ester by controlling the temperature and pressure of the reaction conditions.

Vieville does not describe each and every element of claim 30 because Vieville does not disclose “reacting the organic composition with the C₁-C₄ short chain alcohol in the presence of a catalyst in the single phase” and “producing a final product comprising an alkyl ester and glycerol, wherein the glycerol is separated from the alkyl ester by controlling the temperature and pressure of the reaction conditions.”

As previously discussed, Vieville does not disclose the formation of glycerol during the reaction and also does not disclose that the glycerol is separated from the alkyl ester. Vieville also does not disclose that the separation is performed by controlling the temperature and pressure of the reaction conditions. The only separation mentioned in Vieville is the separation of the organic phase and the catalyst by a filtration process. However, the disclosed separation is not performed by controlling the temperature and pressure of the reaction conditions. Furthermore, the disclosed separation is not analogous to the claimed invention because the separation is performed with conventional media, and not critical media.

Since Vieville does not describe each and every element of the claim, claim 30 is allowable and Applicants respectfully request that the rejection be withdrawn.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on Vieville and further in view of McDaniel et al.

Claims 18, 19, 24, 25 and 28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Vieville as applied to claims 16, 17, 20, 23, 26, 27, 29 and 30 above, and further in view of McDaniel et al. (“McDaniel”). Claim 24 has been cancelled, rendering the rejection of this claim moot. Applicants respectfully traverse this rejection, as hereinafter set forth.

Applicants respectfully submit that McDaniel is not prior art for purposes of 35 U.S.C. § 103(a) and, therefore, its combination with Vieville to reject these claims is improper. The instant application claims priority from WO 00/05327 (PCT/US99/16669) filed on July 22, 1999,

which claims priority from United States provisional application 60/094,076 filed on July 24, 1998. In contrast, McDaniel was published on October 15, 1999, almost fifteen months after the filing date of the provisional application and almost three months after the filing date of the PCT application. Since McDaniel was published subsequent to the priority date of the instant application, McDaniel is not properly used as a prior art reference under 35 U.S.C. § 103(a).

Alternatively, Applicants respectfully submit that a *prima facie* case of obviousness has not been established for the rejected claims. M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of claims 18, 19, 24, 25 and 28 are improper because the cited references do not teach or suggest all the claim limitations and do not provide a motivation to combine to produce the claimed invention.

The teachings of Vieville are as previously summarized.

McDaniel discloses esterification of decanoic acid during supercritical fluid extraction. Experiments were conducted to determine whether methylation of decanoic acid occurred mainly during collection or during extraction. Hydrochloric acid ("HCl") was added to the reaction to determine whether it affected the methylation reaction.

The Examiner relies on McDaniel as teaching a liquid catalyst in the esterification reaction, controlling the temperature to separate the alkyl ester and the critical fluid medium, and recycling the critical fluid medium. Office Action of November 29, 2002, p. 6-7.

Claims 18 and 19 depend from independent claim 16 and, as such, include all the limitations of claim 16. Claims 18 and 19 recite that the catalyst is a liquid phase catalyst

selected from the group consisting of HCl, H₂SO₄, HNO₃, NaOH, and KOH. Claims 18 and 19 are allowable, *inter alia*, as depending from an allowable base claim.

Claims 18 and 19 are further allowable because the cited references do not teach or suggest all the claim limitations or provide a motivation to combine. As acknowledged by the Examiner, Vieville does not teach or suggest a liquid catalyst. Office Action of November 29, 2002, p. 6. Therefore, the Examiner relies on McDaniel as teaching a liquid catalyst in the esterification reaction. However, McDaniel does not cure the previously identified deficiencies in Vieville. Specifically, McDaniel does not teach or suggest "reacting the organic composition with the short chain alcohol in the presence of a catalyst in a single phase to produce a final product comprising an alkyl ester and glycerol" because McDaniel does not teach or suggest that the esterification reaction is performed in a single phase. Rather, McDaniel uses a fluid extraction technique with supercritical fluids to separate components of a mixture. In addition, since McDaniel discloses an esterification reaction, McDaniel does not provide any teaching or suggestion that glycerol is produced, for the reasons previously discussed in the anticipation rejection of Vieville. Furthermore, McDaniel does not teach or suggest "separating the glycerol from the alkyl ester" and "separating the alkyl ester from said critical fluid."

Claims 18 and 19 are further allowable because there is no motivation to combine the liquid catalyst of the supercritical fluid extraction of McDaniel with the teachings of Vieville to produce the claimed invention. The Examiner states that McDaniel provides the motivation to combine the esterification of the fatty acid, as disclosed in Vieville, with the use of a liquid HCl catalyst, as disclosed in McDaniel, because McDaniel teaches the same process of Vieville. Office Action of November 29, 2002, p. 7. However, the portion of McDaniel cited by the Examiner discloses supercritical fluid chromatography to separate products of an esterification reaction and, as such, uses a mobile phase to elute the desired products. The supercritical fluid chromatography technique is not similar to the esterification reaction of Vieville and does not provide the requisite motivation to combine to produce the claimed invention.

Since McDaniel does not teach or suggest all the claim limitations of claims 18 and 19 and does not provide a motivation to combine, Applicants respectfully request that the rejections be withdrawn.

Claim 25 depends from claim 16 and recites the critical fluid medium is recycled for use in a later reaction. Claim 25 is allowable, *inter alia*, as depending from an allowable base claim. In addition, as acknowledged by the Examiner, Vieville does not teach or suggest recycling the critical fluid medium. Office Action of November 29, 2002, p. 6. McDaniel also does not teach or suggest recycling and, therefore, this limitation is not taught or suggested by the cited references.

Since McDaniel does not teach or suggest all the claim limitations of claim 25 and does not provide a motivation to combine, Applicants respectfully request that the rejection be withdrawn.

Claim 28 recites a process for producing alkyl esters useful in biofuels and lubricants. The process comprises providing an organic composition comprising one or more components selected from the group consisting of acylglycerols, fats, oils, waxes, and free fatty acids. A critical fluid medium including one or more fluids selected from the group consisting of carbon dioxide, sulfur dioxide, methane, ethane, propane, and mixtures thereof, is also provided. Optionally, one or more critical fluid co-solvents selected from the group consisting of methanol, ethanol, butanol, and water is included. The organic composition and a C₁-C₄ short chain alcohol are dissolved into the critical fluid medium. The organic composition is reacted with the short chain alcohol in the presence of a catalyst in a single phase to produce a final product comprising an alkyl ester and glycerol, wherein the glycerol leaves the single phase as it is formed. The glycerol is separated from the final product by modifying the temperature and pressure of the final product. The alkyl ester product is separated from the critical fluid by modifying the temperature and pressure of the critical fluid medium.

The cited references do not teach or suggest “reacting the organic composition with the short chain alcohol in the presence of a catalyst in a single phase to produce a final product comprising an alkyl ester and glycerol, wherein said glycerol leaves the single phase as it is formed,” for the reasons previously discussed.

The cited references also do not teach or suggest “separating said glycerol from said final product by modifying the temperature and pressure of the final product” and “separating said alkyl ester product from said critical fluid by modifying the temperature and pressure of the

critical fluid medium.” The Examiner states that these limitations are disclosed in McDaniel. However, the portion of McDaniel cited to by the Examiner discusses the effect of collection temperature on conversion to the methyl ester *i.e.*, the effect of the collection temperature on the reaction of decanoic acid to its methyl ester. McDaniel does not teach or suggest that the temperature and pressure are modified to separate the components of the esterification reaction. Rather, extraction is used to separate these components.

Since McDaniel does not teach or suggest all the claim limitations of claim 28 or provide a motivation to combine, Applicants respectfully request that the rejection be withdrawn.

ENTRY OF AMENDMENTS

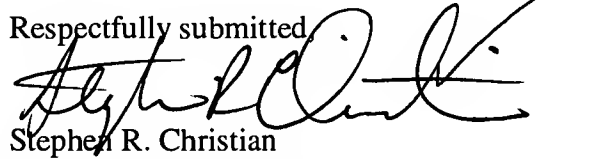
The amendments to claims 16, 28, 29, and 30 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application.

CONCLUSION

Claims 16-23, 25 and 27-30 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants’ undersigned attorney.

Date: February 24, 2003

Respectfully submitted



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Enclosures: Version of Replacement Paragraphs of Specification with Markings to Show Changes Made
Version With Markings to Show Changes Made to The Claims
As-filed copy of the Application

**VERSION OF REPLACEMENT PARAGRAPHS OF SPECIFICATION WITH
MARKINGS TO SHOW CHANGES MADE**

Please replace the paragraph from p. 10, line 13 through p. 11, line 6 with the following.

After completion of the reaction the reaction vessel may be the separation vessel, a final product stream **110** exits the reactor **10** and enters a first product separator **12**. In the first product separator **12** the product stream's temperature and/or pressure are modified to allow the least soluble product in the critical fluid to quantitatively drop out, the glycerol in this embodiment. Once the glycerol has dropped out of the critical fluid medium, a physical separation of the two phases can be readily accomplished. A glycerol product stream **112** and a glycerol depleted product stream **114** exits the first separator **12**. The glycerol depleted product stream **[112] 114** consists of the critical fluid, excess alcohol, alcohol ester of the glycerides and any remaining catalyst, if a liquid catalyst is used, and then enters a second product separator **14**. Again the temperature and pressure of the critical fluid are lowered to allow the desired product, the alkyl ester of the glyceride of this embodiment, to drop out of the critical fluid while retaining the excess alcohol in the critical fluid. The physical separation of the two phases then creates a second product stream of the alcohol ester **116** and the critical fluid recycle **104** which will be reintroduced back into the front of the process after having its pressure and temperature restored to the original input reaction requirements.

VERSION WITH MARKINGS TO SHOW CHANGES MADE TO THE CLAIMS

16. (Amended) A process for producing alkyl esters useful in biofuels and lubricants, said process comprising:

providing an organic composition comprising one or more components selected from the group consisting of acylglycerols, fats, oils, waxes, and free fatty acids;

providing a critical fluid medium including one or more fluids selected from the group consisting of carbon dioxide, sulfur dioxide, methane, ethane, propane, and mixtures thereof;

dissolving the organic composition and [either] a C₁-C₄ short chain alcohol [or water] into the critical fluid medium; [and]

reacting the organic composition with the short chain alcohol [or water] in the presence of a catalyst in a single phase to produce a final product comprising an alkyl ester and glycerol, wherein said glycerol leaves the single phase as it is formed;

~~separating the glycerol from the alkyl ester; and~~

~~separating the alkyl ester from the critical fluid medium,~~

wherein the particular critical fluid medium is selected so that, when combined with the organic composition, the critical fluid medium provides decreased loss of catalyst or catalytic activity and elimination of mass transfer limitations by maintaining the various reactants in a single phase.

28. (Amended) A process for producing alkyl esters useful in biofuels and lubricants, said process comprising:

providing an organic composition comprising one or more components selected from the group consisting of acylglycerols, fats, oils, waxes, and free fatty acids;

providing a critical fluid medium including one or more fluids selected from the group consisting of carbon dioxide, sulfur dioxide, methane, ethane, propane, and mixtures thereof, and optionally including one or more critical fluid co-solvents selected from the group consisting of methanol, ethanol, butanol, and water;

dissolving the organic composition and [either] a C₁-C₄ short chain alcohol [or water] into the critical fluid medium;

reacting the organic composition with the short chain alcohol [or water] in the presence of a catalyst in a single phase to produce a final product comprising an alkyl ester and glycerol, wherein said glycerol leaves the single phase as it is formed;

separating said glycerol from said final product by modifying the temperature and pressure of the final product; and

separating said alkyl ester product from said critical fluid by modifying the temperature and pressure of the critical fluid medium.

29. (Twice Amended) A process for producing alkyl esters useful in biofuels and lubricants, said process comprising:

providing an organic composition comprising one or more components selected from the group consisting of acylglycerols, fats, oils, waxes, and free fatty acids;

providing a critical fluid medium including one or more fluids selected from the group consisting of carbon dioxide, sulfur dioxide, methane, ethane, propane, and mixtures thereof;

dissolving the organic composition and [either] a C₁-C₄ short chain alcohol [or water] into the critical fluid medium; and

reacting the organic composition with the short chain alcohol [or water] in the presence of a catalyst at a temperature from about 20°C to about 200°C and a pressure from about 150 psig to about 4000 psig, wherein the reaction occurs in a single phase to produce a final product comprising an alkyl ester and glycerol and wherein said glycerol leaves the single phase as the glycerol is formed;

wherein the critical fluid ~~medium~~ is [one] selected [to have a critical temperature] ~~such that a reaction temperature is~~ within about 20% of [the reaction] ~~a critical temperature of the critical fluid medium and a reaction pressure is within about 0.5 to about 15 times a critical pressure of the critical fluid medium~~ as modified by a co-solvent [within a range of about 0.5 to about 15 times the reaction pressure].

30. (Amended) A process for producing alkyl esters useful in biofuels and lubricants, said process comprising:

providing an organic composition comprising one or more components selected from the group consisting of acylglycerols, fats, oils, waxes, and free fatty acids;

dissolving the organic composition and a C₁-C₄ short chain alcohol [or water] into a critical fluid medium, wherein the critical fluid medium is one or more fluids selected from the group consisting of carbon dioxide, sulfur dioxide, methane, ethane, and propane, and mixtures thereof, the critical fluid medium solubilizing the organic composition and the C₁-C₄ short chain alcohol [or water] into a single phase;

reacting the organic composition with the C₁-C₄ short chain alcohol [or water] in the presence of a catalyst in the single phase; and

producing a final product comprising an alkyl ester and glycerol, wherein the glycerol is separated from the alkyl ester by controlling the temperature and pressure of the reaction conditions.